CATALYTIC GRANT CASE STUDY: BURKINA FASO

INTEGRATED APPROACHES PILOT PROJECT

FOSTERING CLIMATE-RESILIENT AGRICULTURE FOR RESILIENT MAIZE PRODUCTION SYSTEMS FOR SMALL-SCALE PRODUCERS IN BURKINA FASO (FARMS – BF)

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Abbreviations

AGRA	Alliance for a Green Revolution in Africa
GEF	Global Environment Facility
IAP	Integrated Approaches Pilot
INERA	Institute of Environment and Agricultural Research
MSP	Multi-Stakeholder Platform
RFS	Resilient Food Systems
UNDP	United Nations Development Programme
UEMOA	West African Economic & Monetary Union
VBA	Village Based Advisors

Introduction

Under the second outcome of the Resilient Food Systems (RFS) Programme, one of the Integrated Approach Pilots (IAP) funded by the Global Environment Facility (GEF), UNDP and AGRA co-designed three catalytic grant projects to pilot innovative approaches and model projects to showcase and develop practical methodologies of promoting Green Value Chain Development in East, Southern and West Africa.

In Burkina Faso, the catalytic grant project "*Fostering Climate-Resilient Agriculture for Resilient Maize Production Systems for Small-Scale Producers in Burkina Faso (FARMS – BF)*" aimed to support the development of a resilient maize value chain. INERA (Burkina Faso's National Agriculture Research Organization - http://www.inera.bf), the catalytic grant awardee, developed and released 30 high-yielding, climate-smart (drought, pest, diseases tolerant) and high nutritional (high protein, provitamin A) maize varieties that are suited to the local social and agroecological conditions. Some of the varieties that are known and have been grown for many years include **Barka, Wari, Espoir, Komsaya** and **Bondofa**. New maize varieties that are more suited to the changing climate and ecology of the Hauts Bassins like **AGRA6** and **KABAKO** were developed and earmarked for market release in 2021.

The project was implemented in Houet, Kénédougou, and Tuy districts in the Hauts Bassins Region and Comoé and Léraba in the Cascades region, Southwest of Burkina Faso.

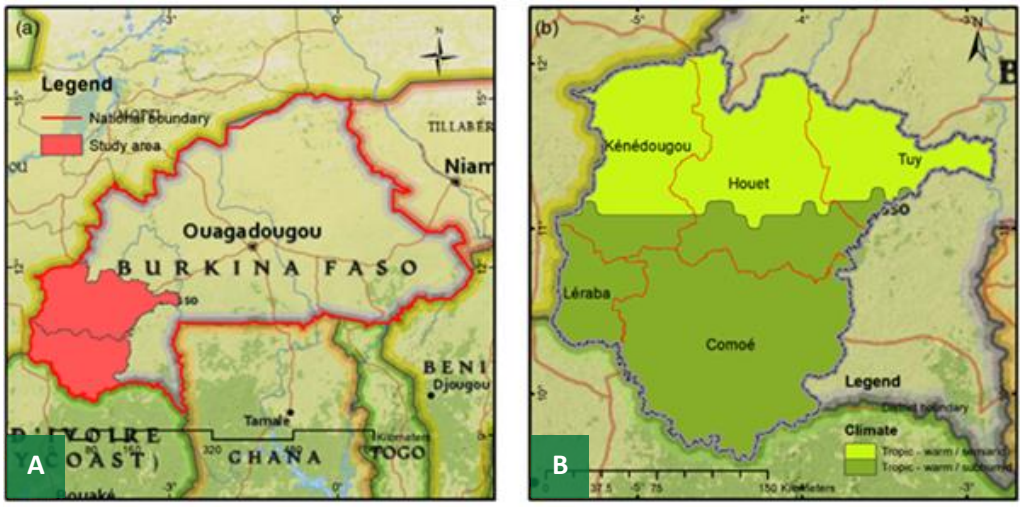

Figure 1: Map (A): Highlighted area marks Hauts Bassin region. Map (B): Highlighted area shows districts within Hauts Bassin region.

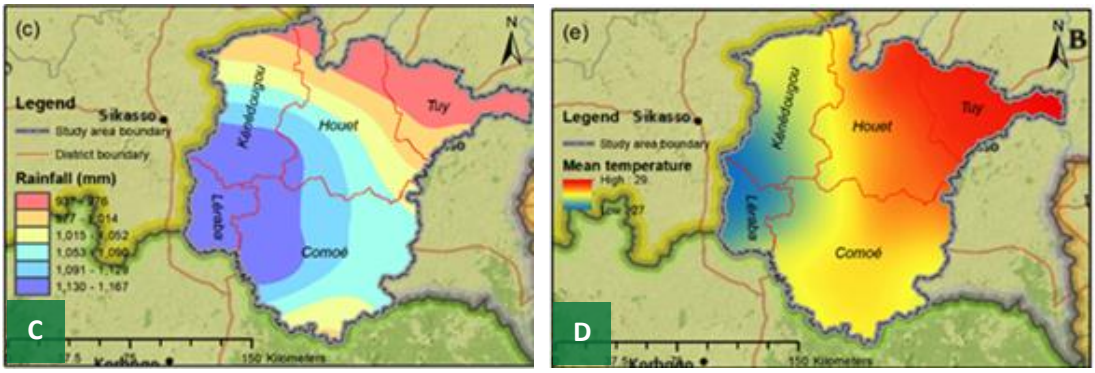

Figure 2: Map (C) and Map (D): Rainfall and temperature distribution, respectively, in the Hauts Bassins Region. (Areas most affected by climate change are to the north of the region).

This catalytic grant project intended to raise value chain actors' awareness of the potential and characteristics of these resilient maize varieties for increased adoption as socio-ecological resilience building technologies. **These varieties, if used in an integrated manner, at the farm level, and under sustainable agronomic practices, can strengthen the resilience of the farmers to external shocks due to the increased level of productivity.**

Based on the lessons learnt from past experiences (mainly failures in the maize value chain), the project proposed a new delivery model to fill gaps in basic seed production in Burkina Faso. **Regenerative practices and integrated soil fertility management** were introduced in the extension messaging and used to integrate natural resources management to address the soil and fertility degradation on smallholder farms. Soils are generally characterized by low nutrient and organic content. Climate change has made these conditions worse. By deploying these practices, the project is contributing to building of adaptation capacities of systems and farmers in response to climate change and environmental change impacts. The project deployed a **Multi-stakeholder Platform (MSP) approach** to facilitate interaction of stakeholders and transfer technologies/knowledge to farmers to provide space for organized engagement. The platforms also established networks and linkages for private sector participation in adaptation initiatives through, for example, the use of contract farming. The project utilized an innovative extension systems model called the Village Based Advisors (VBA) model and the hub agro-dealers model to help smallholder farmers access technologies and markets.

This case study documents the process of the implementation of the catalytic grant. It puts together key lessons, success and/or failure factors, and outlines the project results as part of the process of documenting and disseminating information that can be used by multiple stakeholders including policy and decision-makers, project developers, funding agencies, and the private sector for widescale application of greening principles in food systems particularly in response to the challenges and impacts of climate change and environmental degradation.

Context

Maize (Zea mays) is ranked as the third great grain crop after wheat and rice globally (Nuss & Tanumihardjo, 2010). The maize value chain is among on the list of priority crops for food, nutrition and income security identified by the government of Burkina Faso. Maize has been an important crop for smallholder farmers in most of the regions including Boucles du Mouhoun (BM), Hauts Bassins (HB) Cascades (CD) and Centre-Ouest (CO). Further, maize is one of the 5 priority crops in the West African Economic and Monetary Union (UEMOA) region which has been the subject of a food systems and agriculture master plan that was adopted by regulation No. 06/2007/CM/WAEMU of this regional economic body.

However, maize productivity remains low due to several factors, including climate change, low soil fertility, pests and diseases, the prevalent use of low-quality seeds and low-yielding inputs, low adoption of sustainable technologies, poor post-harvest management, limited extension services and weak market linkage.

The yield gap of maize in Burkina Faso is about 50% (current farmer yield is less than 2 MT/ha versus potential yields of 8-10 MT/ha and attainable yield of 5 MT/ha) (AGRA; FAOSTAT; CNS[1], 2014). This is so despite the availability of several high-yielding maize varieties in the country varieties on the market.

To address the maize value chain challenges in Burkina Faso, the catalytic project was anchored on two key entry points for integrating sustainability principles into the maize value chain – building a responsive and resilient seed system and private sector integration in the value chain. The catalytic project focused on increasing production and adoption of climate-resilient high-yielding maize varieties by farmers in the project areas. Specifically, the project aimed to increase the maize productivity of smallholder farmers by adopting improved technologies (seeds) and regenerative agricultural practices, such as using organic composts to complement inorganic fertilizers. With improved productivity, the project aims to contribute to the reduced expansion of farming lands into areas that can be conserved for biodiversity health and ecosystem resilience to the effects of climate change and land degradation. Hence, increase smallholder farming households' and agricultural systems' capacity to better prepare for and adapt to shocks and stresses.

Project Approach

The project design and implementation utilized a resilient and sustainable food value chain (RSFVCD) approach (see Figure 1 below). The project mainstreamed climate change impact resilience and long-term project sustainability. It identified the five main stages in the maize value chain: inputs, production, aggregation, processing, and distribution & marketing. Various actors were further identified at each stage, including agro-dealers, seed companies, off-takers fellow farmers, smallholder farmers, local traders, input suppliers, local traders, export markets, and food companies. The NGOs, government, extension officers, and financial institutions were the main actors providing support services. These actor and stakeholders, including the farmers formed the MSP which facilitated interaction of stakeholders in the maize value chain in the project areas.

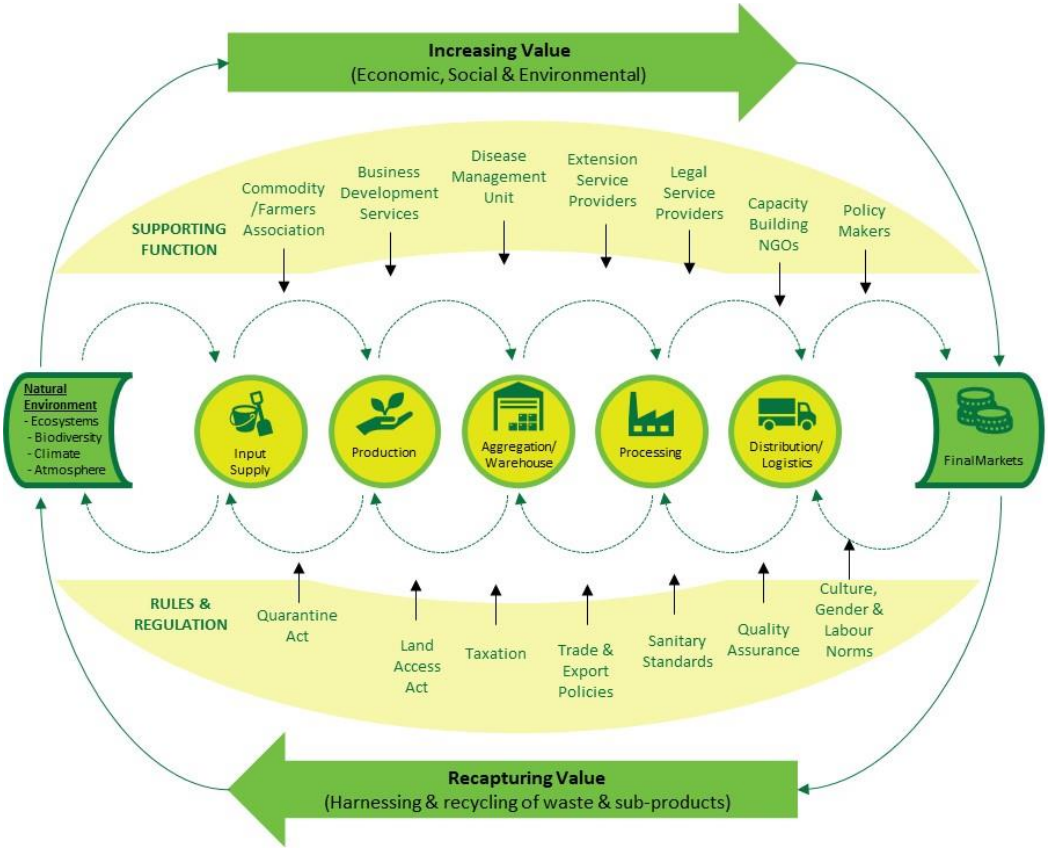

Figure 3: Resilient and sustainable food value chain (RSFVCD) framework (Source: AGRA & UNDP 2020).

The project employed a Multi-stakeholder Platform (MSP) approach as a point of entry for the actors to cooperate to produce higher-quality products and provide services to one another. Key partners that were identified and the roles they played in the project can be found in table 1.

Table 1: Key project stakeholders and roles

Project partners	Key roles
National Agricultural Research Institutes	Development of resilient varieties such as the Kabako variety
Government (Ministry of Agriculture)	Selection and formation of community agribusiness advisors (CAAs) and overall policy and institutional support for the strengthening of the value chain,
AGRA & UNDP	Technical Assistance on extension services, seed systems development, input distribution strengthening, formation and operationalisation of MSPs
SMR seed company	Seed multiplication, distribution and demonstration plots

The project planned to reach and support at least 20,000 smallholder farmers with a land holding size of approximately 1-2 hectares per farmer in the project regions with innovative technologies and strategies to mitigate risks and strengthen their resilience in an unpredictable climate and changing environment.

The project connected small-scale producers to the input supply chain systems. To reach the optimum yield of the varieties, the project promoted the adoption of good agronomic practices such as integrated soil fertility management, compost application and postharvest management through the use of community extension agents – the Village-based Advisors. The project set up, in each project area, composting sites. Each of the provinces hosts 50 demonstration fields on integrating multipurpose trees (*Cajanus cajan*), in farmers' fields, to enhance soil fertility. In addition to the demonstration fields, smaller demos were replicated in the other farmer's fields.

The project recruited and worked with 250 VBAs (volunteers) who were trained in extension services provision and sustainability practices and principles. It facilitated and sustained partnerships and linkages with private seed companies on seed production and distribution mechanisms.

Specific Project Activities

• Input Supply

Greening of the maize value chain starts with sourcing climate-smart inputs. The project therefore worked with INERA and local seed companies on the finalization and development of a market-led distribution system for a resilient and drought-tolerant maize variety, named **Kabako**. The variety is drought and pest/disease-tolerant and high-yielding. The variety can withstand climate changes such as erratic rainfall, drought and pest and disease infestation. In addition to strengthening seed systems the project trained farmers, via the VBA extension system on integrating pigeon pea *(Cajanus cajan)* in the farming system. Further, smallholders are trained in compost production and application. Concerted efforts have been designed to ensure timely access to different fertilizers such as Nitrogen-Phosphorous-Potassium (NPK) and Urea.

The local seed companies that participated in maize crop demonstrations, in collaboration with INERA, were tasked to produce or multiply Kabako-certified seeds. The seeds were promoted to farmers through an organised system of mother-baby demonstration sites that facilitated the adoption of this crop variety. The findings on the catalytic grant showed that maize yield per season was 4.5 Mg ha^{-1}. A 2.2, and 2.57 fold yield increase compared to the regional and national averages of 2.05 Mg ha^{-1} and 1.75 Mg ha^{-1}.

Table 2: Demo crop yields in comparison to regional average yields of maize

Region	District*	Maize grain yield in kg ha^{-1}	
		Smallholder farms	Demonstration plots
Hauts Bassins	Houet	1,298	3,958
	Kénédougou	2,039	5,150
	Tuy	2,049	4,590
Cascades	Comoé	1,996	4,530
	Léraba	1,748	4,457

*Total of 5 districts

• Production

Greening maize production faces numerous challenges, including continued variability due to climate change, limited input access, and a shortage of mechanization throughout the value chain. Additionally, the deployment of practices and technologies at the farm level such as intercropping was hampered by the limited access to pigeon pea seeds which was the selected intercropping crop. There was also a limitation of time that affected the process of compost production. Climate-smart approaches that were demonstrated in the plots showed the potential to double crop yields compared to conventional farmer practices and approaches.

Using environmentally friendly, socially acceptable and economic practices, the project enhanced productivity and profitability. Smallholders were trained in recommended planting practice such as appropriate spacing, timing, mulching, and integrated water management. Planting early maturing seeds was also promoted as it helped farmers attain increased yields even during times of low and poorly distributed rains.

Seed companies participated in the establishment of demonstration plots, training of farmers and transfer of water harvesting technologies. This was part of the capacity development in resilience building that contributed to the generation of additional profits for the seed companies.

> "Under the AGRA-UNDP partnership, two hundred and twenty-four (224) demonstration plots on maize and pigeon pea (Cajanus cajan) strip cropping were established in five provinces across the Hauts Bassins and Cascades regions in Burkina Faso by Village Based Advisors, trained by Burkinabe National Agricultural Research Institute (INERA)."– Dr. Abdalla Dao, Project Manager

The use of strip cropping, intercropping, and crop rotation of maize and the pigeon peas provided smallholders with multiple advantages including:

- Pigeon pea is a drought-resistant crop that survives in harsh weather conditions, so farmers are assured of legume harvest even with limited rains.
- The crop has high nutritional value and is thus suitable for addressing malnutrition and food insecurity.
- The legume crop fixes nitrogen that is used by the maize.
- Pigeon peas can survive during the dry season and provide forage when other crops are dry. The forage can be used to feed livestock or sold to earn income.

Figure 4: Maize pigeon pea strip cropping in Burkina Faso

Continuous cropping without nutrient replenishment is a common challenge facing farmers in Burkina Faso. The project trained farmers to prepare compost manure. Additionally, the project actively trained the smallholder farmers on the 4Rs of fertilizer use - Right Time, Right Place, Right Type and Right Amount.

The smallholders were trained to apply compost and fertilizers using micro-dosing techniques for both maize and pigeon peas. Green manure from the leaves of the pigeon pea plants was also used in the fields to enhance nitrogen availability in the soils.

Figure 5: Soil fertility management technologies: Compost manure preparation (A) and second application of fertilizer and pigeon pea leaves incorporation (B).

Figure 6: Chopping machine for compost manure ingredients.

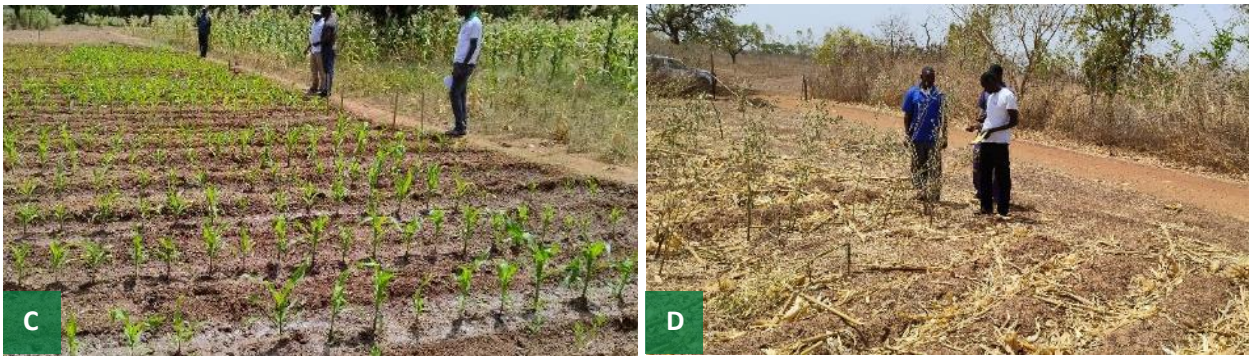

Figure 7: Maize planting and soil water conservation spacing (C) and mulching (D)

- ## Post-harvest Management

Appropriate postharvest management of crops is a key phase in the building of resilient value chains as it ensures the quality of the crop that ends up on the market as well has the level on income earned by farmers. Upon harvest, smallholders were trained on using proper drying and improved storage facilities.

Moisture measuring technologies were also promoted at the local level, where the Village-based advisors (VBAs) played a key role in the diffusion and adoption of this technology to ensure the crops are sold at optima prices. The use of hematic bags as shown in the photo below was promoted in project areas. These storage bags are biodegradable and airtight; thus no application of external inputs was applied to the grain.

Figure 8: Smallholder maize farmers' training on the use of Improved storage

- ## Processing

The project played a crucial role in promoting the processing of maize in Burkina Faso. Quality processing is vital for enhancing marketable value. First, smallholders were trained in manually sorting and grading maize. The practice of manual sorting and grading improves the quality of maize by separating damage from clean grain. This enhances returns and reduces loss and damage by pests and diseases. Further, sorting and grading lower aflatoxin infestation.

Figure 9: Training on sorting and grading maize grains.

- ## Marketing and Supporting Services

The projects strengthened the role of maize off-takers who play a critical role of providing market at the farm gate. In addition, the off-takers supplied the farmers with inputs, as part of improved access to blended finance for farmers. According to the multi-stakeholder analysis and platforms, the leading players in the Burkinabe

Maize value chains included: seed companies, farmers and agro-input suppliers. Seed manufacturing companies played a vital role in the establishment of demonstration plots, while Agro-input suppliers play a crucial role as input supplies and in the market.

The role of aggregators/off-takers especially their links with other players like commercial farmers, millers, and exporters in the entire project activities could have been further enhanced to expand the available markets for maize at regional level. This was undertaken due limitations of time on the project.

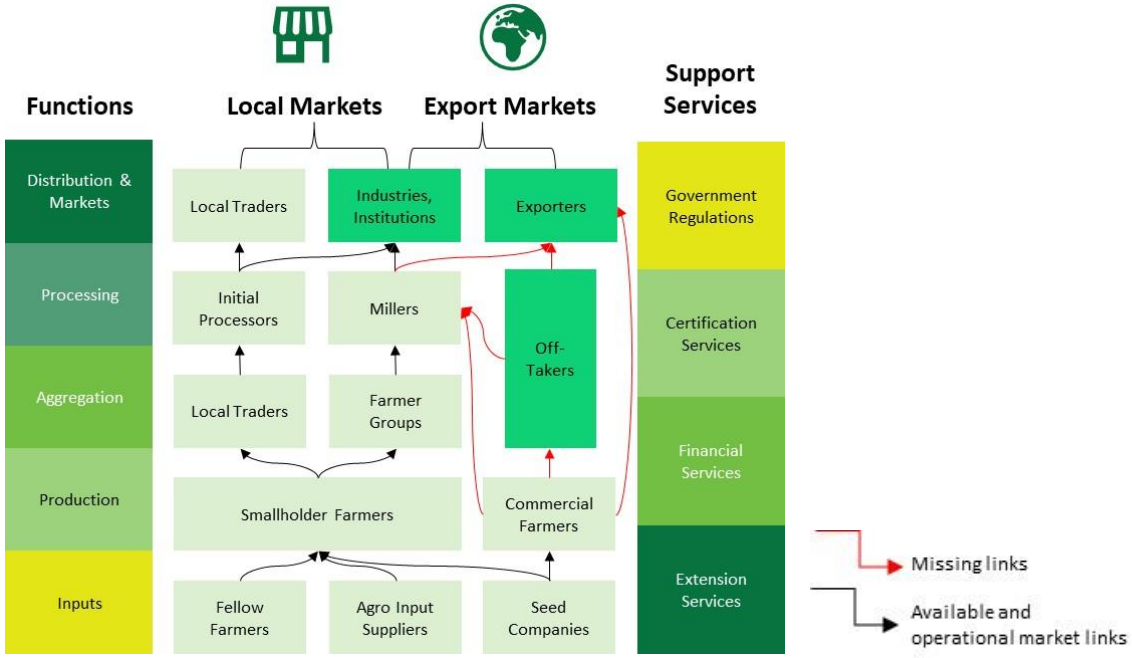

Figure 10: The Map of Maize Value Chain in Burkina Faso.

In terms of the supporting services, UNDP and AGRA organized smallholder field visits to train extension officers and village-based advisors (VBAs) for the catalytic project. The demonstration plots were used to pass instrumental greening information to smallholder farmers. First, the smallholders were organized into groups. Through the training, the demand for drought-resistance seeds increased. Afterward, the smallholders were trained on the uptake of the drought-resilient value chain and implementing sustainable technologies, including compost preparation.

Project Results

The project has established innovative extension approaches, such as Community Agribusiness Advisors, and Village-Based Advisors, and trained agro-inputs extension officers. This led to enhanced dissemination of agricultural innovations to help enhance resilient maize seed systems to farmers.

128 extension officers and 237 VBAs were trained. Out of the 237 VBAs trained, 236 maize and Pigeon pea demonstration plots were established in Burkina Faso by VBAs (Table 3). Female involvement in the training and establishment of the demonstration plots was low, this was mainly due to the prevailing cultural and religious norms in the project areas that do not encourage women to participate in programmes that involve impartation of extension knowledge. The project only manged to recruit 10 female VBAs. All ten females were trained as VBAs and set-up demonstration plots that were used as learning sites.

Table 3: Extension officers and Village-Based advisors trained, and the demonstration plots established by VBAs

Regions	Districts	Extension officers Trained		Village-Based Advisors trained		VBA* implemented demonstration plots	
		Men	Women	Men	Women	Men	Women
Cascades	Comoé	20	8	47	1	47	1
	Léraba	20	1	44	4	44	4
Hauts Bassins	Houet	18	9	48	1	47	1
	Kénédougou	22	5	44	2	44	2
	Tuy	20	5	44	2	44	2
Total		**100**	**28**	**227**	**10**	**226**	**10**

** Village Based Advisors*

There were 10,099 smallholder farmers trained through the VBAs and the demonstration plots (Table 4). 21 groups composed of 306 men and 34 women were trained in composting (Table 5).

Table 4: Smallholders trained through demonstration plots and seeds demanded in Burkina Faso

Regions	Districts	Smallholders Trained		Seed demand (kgs.)
		Men	Women	
Hauts Bassins	Houet	1,679	1,035	730
	Kénédougou	1,177	735	566
	Tuy	1,260	496	336
Cascades	Comoé	1,325	545	2,100
	Léraba	1,131	716	3,036
Total		**6,572**	**3,527**	**6,768**

Table 5: Composting demonstration plots and smallholders from different villages in Burkina Faso

Regions	Districts	Village	Groups	Men	Women
Hauts Bassins	Houet	Satiri	1	15	0
		Bobo	5	30	9
		Kouentou	1	5	0
		Toussiana	1	14	1
	Tuy	Houndé	2	34	0
		Koumbia	2	71	4
	Kénédougou	Djigouéra	1	6	4
		Orodara	2	21	4
		Koloko	1	45	0
Cascades	Comoé	Bérégadougou	1	13	4
		Moussodougou	1	12	3
		Niangoloko	1	15	0
		Soubakaniédougou	1	15	0
		Banfora	1	10	5
Total			**21**	**306**	**34**

The smallholders reported maize farming played a significant role in income generation. Cost-benefit analysis shows an average gross margin (profit) of FCFA 767,500, approximating USD 1,280 per hectare without accounting for pigeon pea grain and forage. The pigeon pea grain and forage income increase the economic gains and resilience of the maize cropping systems in Burkina Faso.

Lessons Learned and Reflections

The Burkina Faso catalytic project was central to greening the maize value chain and generated valuable lessons and developed a model of delivery that promoted market-led sustainability of resilient practices that could be used to scale integrated approaches at country level:

- Kabako, a drought-resilient maize seed variety, was established for enhanced yields and coping with climate change. Evidence from the demonstration plots showed that the Kabako seed variety doubled crop yields compared to smallholder farms and regional and national averages.
- The project used the Village Based Advisors (VBAs) extension model. Extension officers and VBAs were trained on implementing improved seeds, composting, strip cropping, intercropping, crop rotation, and water management technologies.
- Intercropping maize and pigeon pea was a novel innovation that enhanced smallholders' livelihood by providing proteins and forage for livestock. The pigeon pea fixed nitrogen to the soil, thus increasing maize yields. The leaves from the pigeon pea were also incorporated into the soil, acting as green manure.

The connection or linkage with the nationally led IAP project was adequate to transfer lessons and technologies to the larger GEF-supported programme.

However, under this catalytic grant pilot, the role of aggregators/off-takers especially their links with other players such as commercial farmers, millers, and exporters could be further enhanced. Another reflection is that involvement of women in the training and establishment of the demonstration plots needs to be strengthened.

In terms of the overall project design, there was a mismatch in the implementation sequence of the catalytic grant and the larger IAP programme. The Catalytic grant in Burkina Faso came into operation in 2021 whilst the larger IAP programme had been in operation for a longer period. Thus, the catalytic grant will require more time to document private sector integration in value chains.

Recommendations

Based on the key lessons learned from the project, the following suite of recommendations are drawn to build sustainability and resilience of the maize value chain:

- Gender mainstreaming in the project to include more women in the implementation and enhance gender sensitivity is critical element that needs to receive additional effort to ensure that capacities for resilience are just and inclusive. More in-depth gender assessments are needed in areas with complex social cultural and religious characteristics to understand and design appropriate interventions.
- The VBAs could act as project entrepreneurs by supplying improved seeds, fertilizers, and compost and selling maize yields to the off-takers. Their role, as seen from the project was central to enhancing market-led maize productivity value chains. The VBA model also provided employment opportunities for young people in the project areas.
- Smallholder groups need to be empowered to act as aggregators and bulk the maize yields for marketing.
- Deliberate engagement of financial institutions and contract farming in the maize value chain for improved returns and resilience.

For more information, contact:

Partners: UNDP, AGRA, INERA (Burkina Faso's National Agriculture Research Organization)